

Protective Devices by Lycaenid Butterflies Against the Attacks of Lizards and Birds.

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Among the subfamilies composing the LYCAENIDAE, commonly called the "blues," there are several which show a conspicuous eye-spot on the margin of the underside of the hind wing, coupled with a pair of tails, or often two pairs of tails, of varying length and thickness.

When the butterfly is at rest with wings closed, the tails are in many cases crossed the one over the other and kept in motion by an irregular rotatory movement of the hind wings. In other species the tails are long and fragile and are stirred by any breeze which is blowing. Again in other species the tails are short or absent but the eye-spots conspicuous. The wings are in some cases slightly separated, which throws a shadow between, giving an appearance of breadth when viewed from behind.

This device has been generally attributed to an imitation, perfected by natural selection, of the head or in many cases the head and antennae, the enemy being led to attack the brittle hind wings, which break and allow the butterfly to escape. This has been noted by many writers and is usually referred to as being a protection against insectivorous birds, although other enemies are frequently mentioned. It would appear, however, that in Malaya the device is directed not so much against birds as against wingless foes, chief among these being lizards.

The device of eye-spots and tails is not shown in many families of Malayan butterflies, and in no other is it brought to such a state of perfection.

Many species of Lycaenids, in contradistinction to the majority of butterflies, pass their lives close to the ground rather than at the tops of the trees. When disturbed, they rely on a short flight of a few yards and a "disappearance" by alighting suddenly on a leaf, when their closed wings render them inconspicuous. On a number of occasions I have followed up some of the commoner Lycaenids, putting them to flight and watching their actions, and on no single occasion has the butterfly alighted out of reach of my net, the usual height being 4 ft. to 6 ft. It therefore follows that enemies against which these insects must protect themselves hunt in bushes as well as in trees.

Birds are not common in the lower depths of the jungle, and Lycaenids inhabiting paths shut in by trees would be largely free from their attentions. Lizards, however, would appear to be quite as common at low elevations as among the tree tops.

The majority of lizards appear to catch their prey by the use of sight only. They approach, often from a considerable distance, at a fairly rapid rate, ending with a cautious "one foot at a time" advance, and a final swift grab at the insect.

A lizard would in most instances approach the insect from a branch, eventually climbing out from the base of the leaf on which it had settled. A bird* would either catch a butterfly in flight, (unlikely in the case of the Lycaenids), or would make a quick peck at one which settled near to its perch. It does not appear possible that a bird could make a sufficiently quiet approach to stalk a Lycaenid successfully.

As the result of a number of observations, I find that some species of Lycaenids show a certain amount of discrimination in settling. They choose an exposed position rather than one among the leaves and usually the upper side of the leaf. The position is generally near the centre of the leaf, and the head of the butterfly in perhaps 90% of cases is lower than the tail. The point of the average leaf being lower than the fixed end, it follows that the butterfly presents its protective apparatus to the end of the leaf which is attached to the branch. This appears to indicate that the dangers to be avoided come from the bush rather than from the air.

I have never seen a jungle lizard in the act of catching a butterfly. However, the common Chi-chah of the houses (*Hemidactylus frenatus*), although principally a night feeder, offers an opportunity for experiment. I have on several occasions liberated Lycaenids in a room at night, but on account of the jolting received on the way home or perhaps the absence of daylight, the butterfly generally flutters to a wall and remains absolutely still, without any rotation of the wings. Chi-chahs as a rule take no interest in an insect which they do not see in motion, and if the butterfly is disturbed with a stick, the Chi-chahs usually take fright and refuse to feed.

In Penang, in January 1921, I liberated 17 Lycaenids. There were several other insects in the room, attracted by the light and the Chi-chahs had already dined and were not very active. Three of the butterflies were attacked. One was taken by the head and eaten. Two were attacked from the tail, but in both cases the snap missed the butterfly entirely and it escaped. It is difficult to make this experiment in Singapore, as suitable butterflies are not very common.

The proportion of Lycaenids showing this protective device, which are deficient of part of the hind wings, is relatively large, and in worn specimens which have been flying for some days, might be put as high as 10%. The broken portion generally resembles the rounded shape of a lizard's mouth rather than the sharp bill of a bird, and it can be demonstrated with forceps that the wings will fracture where gripped, and not naturally with a rounded shape.

It appears to me that the Lycaenids showing this device are protecting themselves against lizards rather than against birds, and it would be interesting if observations on the subject could be collected.